

## ABSTRACT

5       The present invention provides compact adsorption systems that are capable of  
rapid temperature swings and rapid cycling. Novel methods of thermal swing adsorption  
and thermally-enhanced pressure swing adsorption are also described. In some aspects of  
the invention, a gas is passed through the adsorbent thus allowing heat exchangers to be  
very close to all portions of the adsorbent and utilize less space. In another aspect, the  
adsorption media is selectively heated, thus reducing energy costs. Methods and systems  
10   for gas adsorption/desorption having improved energy efficiency with capability of short  
cycle times are also described. Advantages of the invention include the ability to use  
(typically) 30-100 times less adsorbent compared to conventional systems.

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